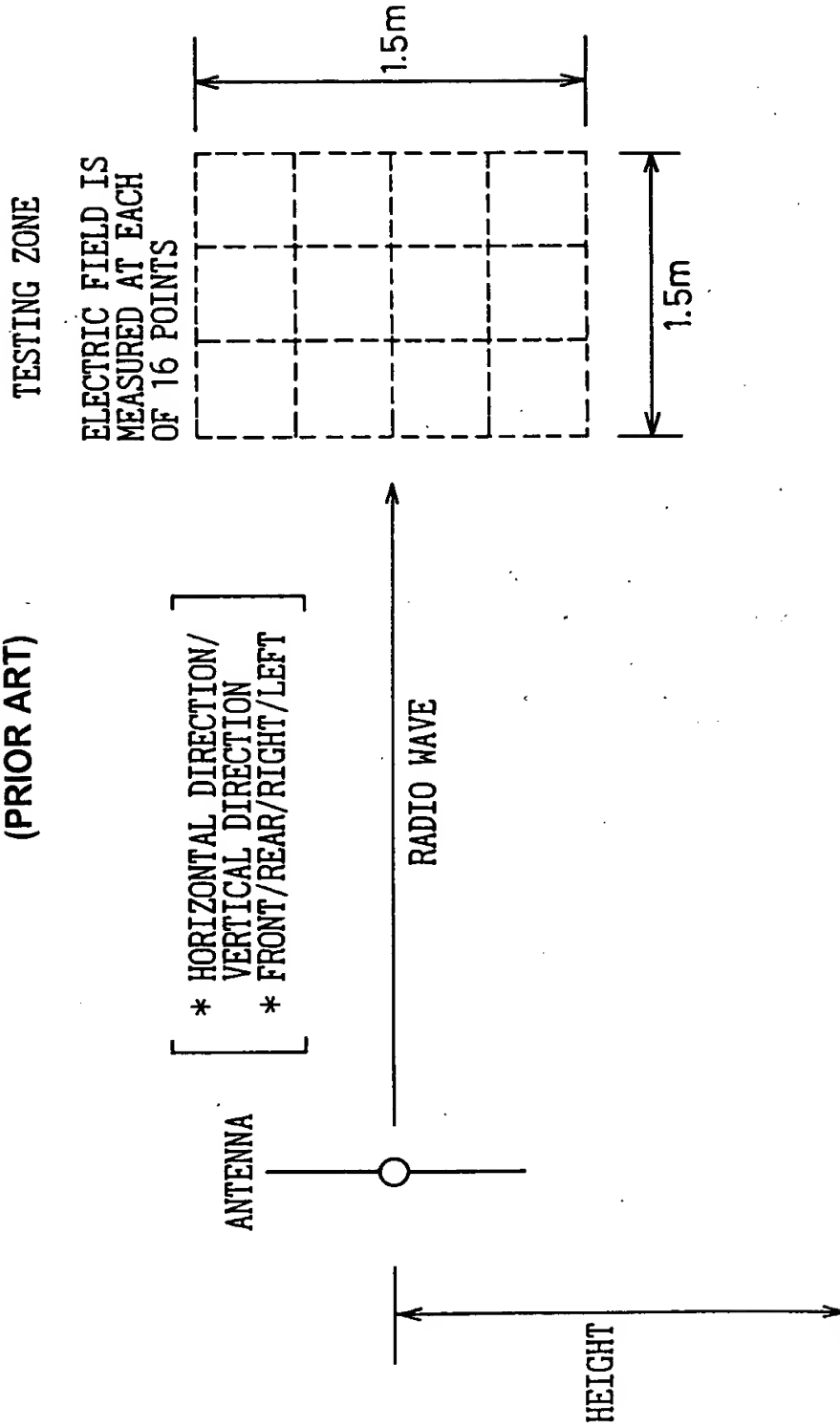


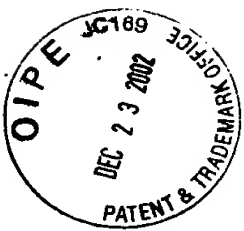
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Fig.4

(PRIOR ART)



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Fig. 6A (PRIOR ART)

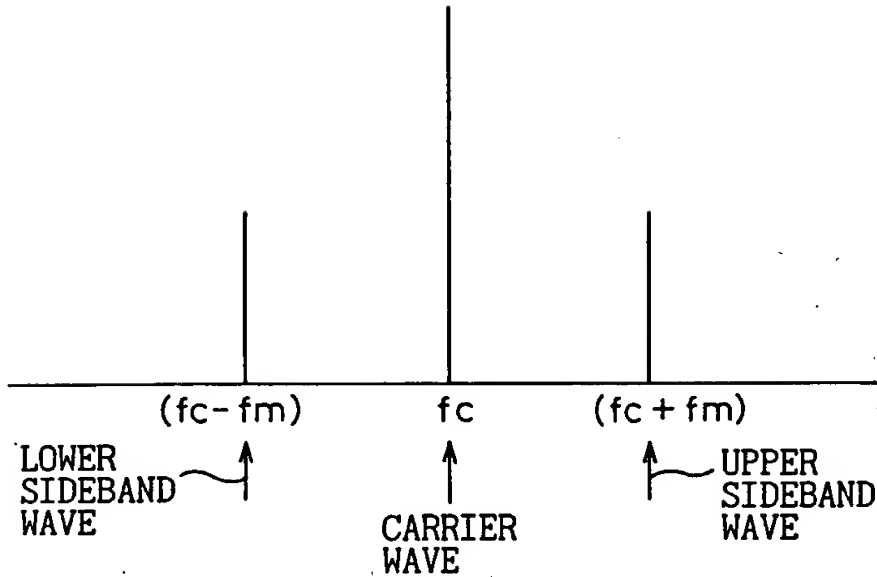
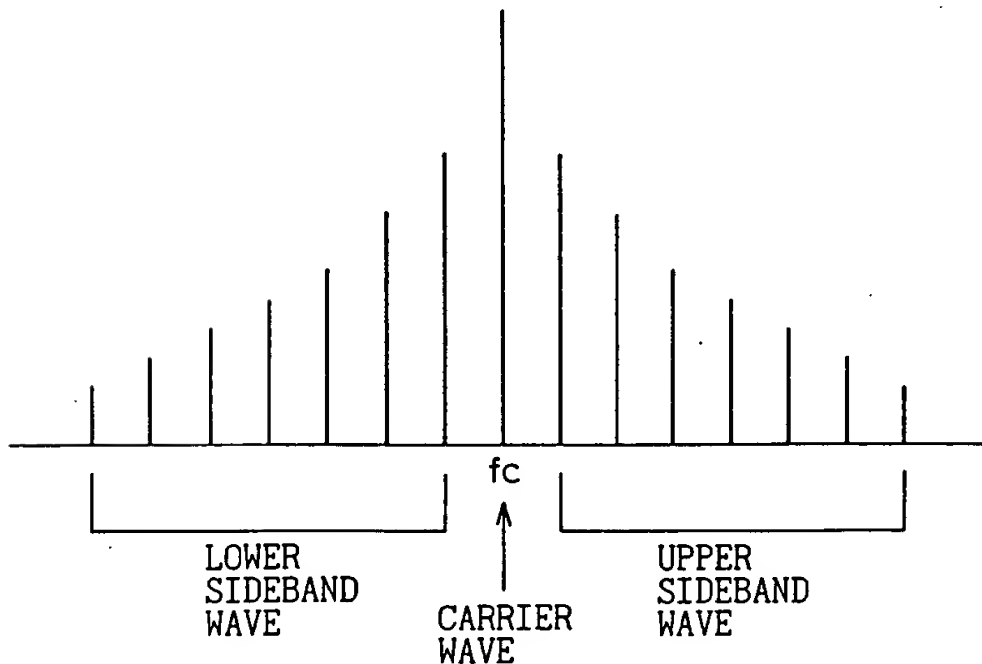
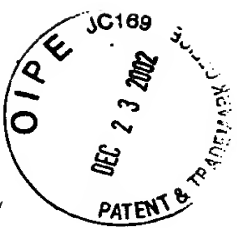


Fig. 6B (PRIOR ART)



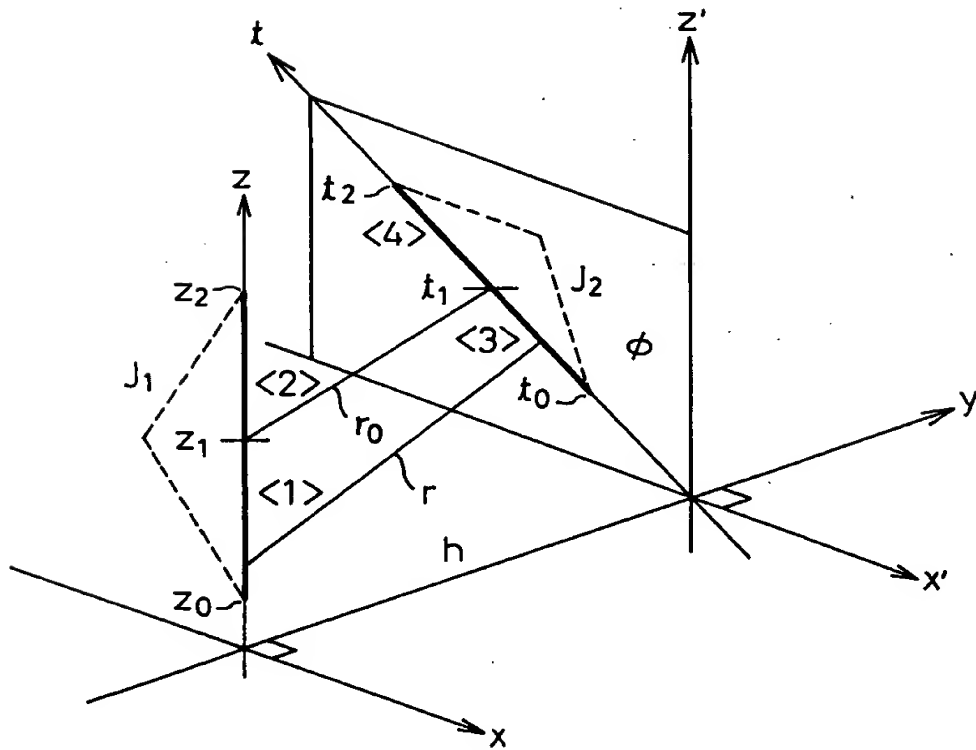
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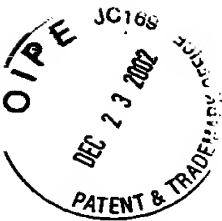
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SERIAL NO.: 09/282,425
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Fig.11 (PRIOR ART)



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Fig.12A (PRIOR ART)

$$Z = j\omega \int_s \left[\frac{\mu}{4\pi} J_1 J_2 \cos \phi \frac{e^{-jkr}}{r} + \frac{1}{4\pi\epsilon} \rho_1 \rho_2 \frac{e^{-jkr}}{r} \right] ds$$

Fig.12B (PRIOR ART)

$$Z_{13} = \frac{j\omega\mu}{4\pi \text{sinkd}_1 \text{sinkd}_3} \int_{t_0}^{t_1} \int_{z_0}^{z_1} [\text{sink}(z-z_0) \text{sink}(t-t_0) \cos \phi_1 - \text{cosk}(z-z_0) \text{cosk}(t-t_0)] \frac{e^{-jkr}}{r} dzdt$$

$$Z_{14} = \frac{j\omega\mu}{4\pi \text{sinkd}_1 \text{sinkd}_4} \int_{t_1}^{t_2} \int_{z_0}^{z_1} [\text{sink}(z-z_0) \text{sink}(-t+t_2) \cos \phi_2 + \text{cosk}(z-z_0) \text{cosk}(-t+t_2)] \frac{e^{-jkr}}{r} dzdt$$

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Fig.13 (PRIOR ART)

N: NUMBER OF
ELEMENTS
WAVE SOURCE

ELECTRIC
CURRENT

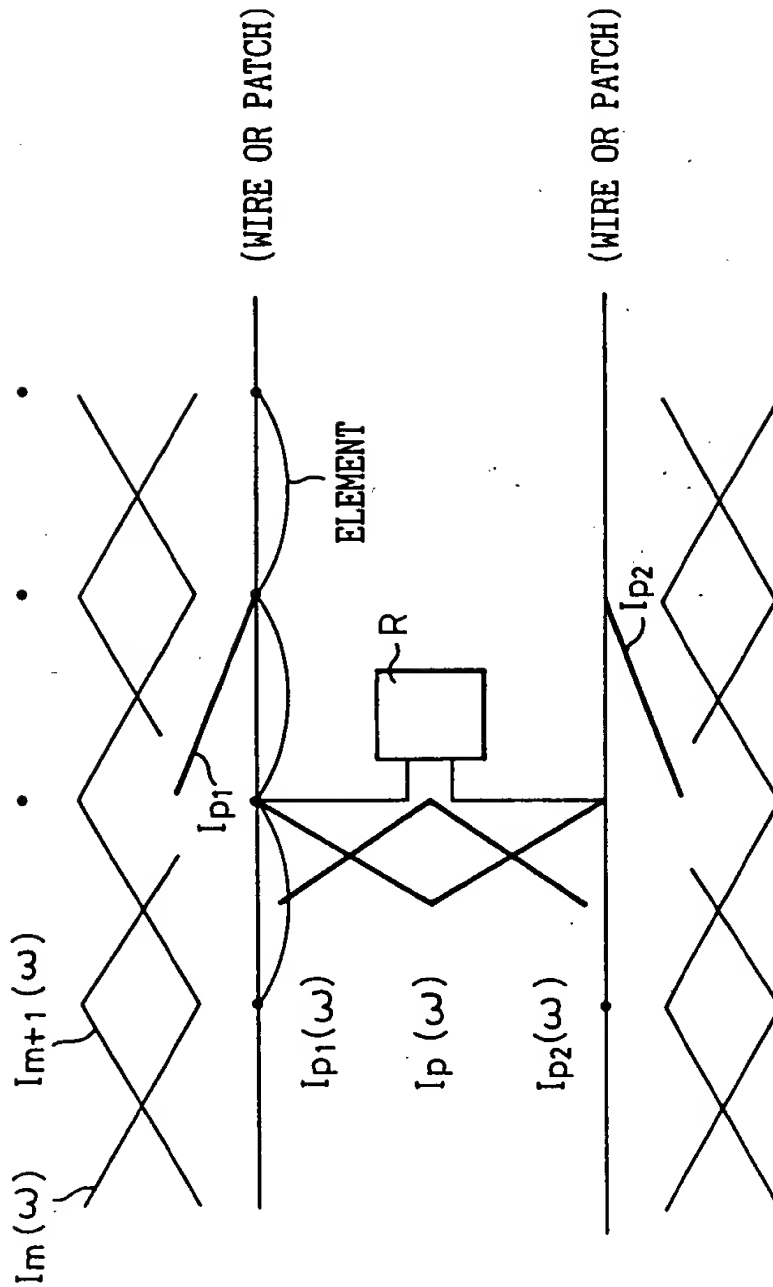
MUTUAL IMPEDANCE

$$\begin{bmatrix} Z_{11} & Z_{12} & Z_{13} & \cdot & \cdot & \cdot & Z_{1N} \\ Z_{21} & Z_{22} & Z_{23} & \cdot & \cdot & \cdot & Z_{2N} \\ Z_{31} & Z_{32} & Z_{33} & \cdot & \cdot & \cdot & Z_{3N} \\ \cdot & \cdot & \cdot & \cdot & \cdot & \cdot & \cdot \\ \cdot & \cdot & \cdot & \cdot & \cdot & \cdot & \cdot \\ \cdot & \cdot & \cdot & \cdot & \cdot & \cdot & \cdot \\ Z_{m1} & Z_{m2} & Z_{m3} & \cdot & \cdot & \cdot & Z_{mN} \\ \cdot & \cdot & \cdot & \cdot & \cdot & \cdot & \cdot \\ \cdot & \cdot & \cdot & \cdot & \cdot & \cdot & \cdot \\ \cdot & \cdot & \cdot & \cdot & \cdot & \cdot & \cdot \\ Z_{N1} & Z_{N2} & Z_{N3} & \cdot & \cdot & \cdot & Z_{NN} \end{bmatrix} = \begin{bmatrix} I_1 \\ I_2 \\ I_3 \\ \cdot \\ \cdot \\ \cdot \\ I_m \\ \cdot \\ \cdot \\ \cdot \\ I_N \end{bmatrix} \begin{bmatrix} V_1 \\ V_2 \\ V_3 \\ \cdot \\ \cdot \\ \cdot \\ V_m \\ \cdot \\ \cdot \\ \cdot \\ V_N \end{bmatrix}$$

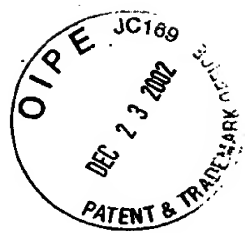
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Fig.14 (PRIOR ART)



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Fig.15A (PRIOR ART)

$$I_p(Z_{pp}+R)+I_{p1} Z_{pp1}+I_{p2} Z_{pp2}+\sum_{n=1}^M I_n Z_{pn}=0$$

Fig.15B (PRIOR ART)

$$I_p = \frac{-1}{Z_{pp}+R} [I_{p1} Z_{pp1}+I_{p2} Z_{pp2}+\sum_{n=1}^M I_n Z_{pn}]$$

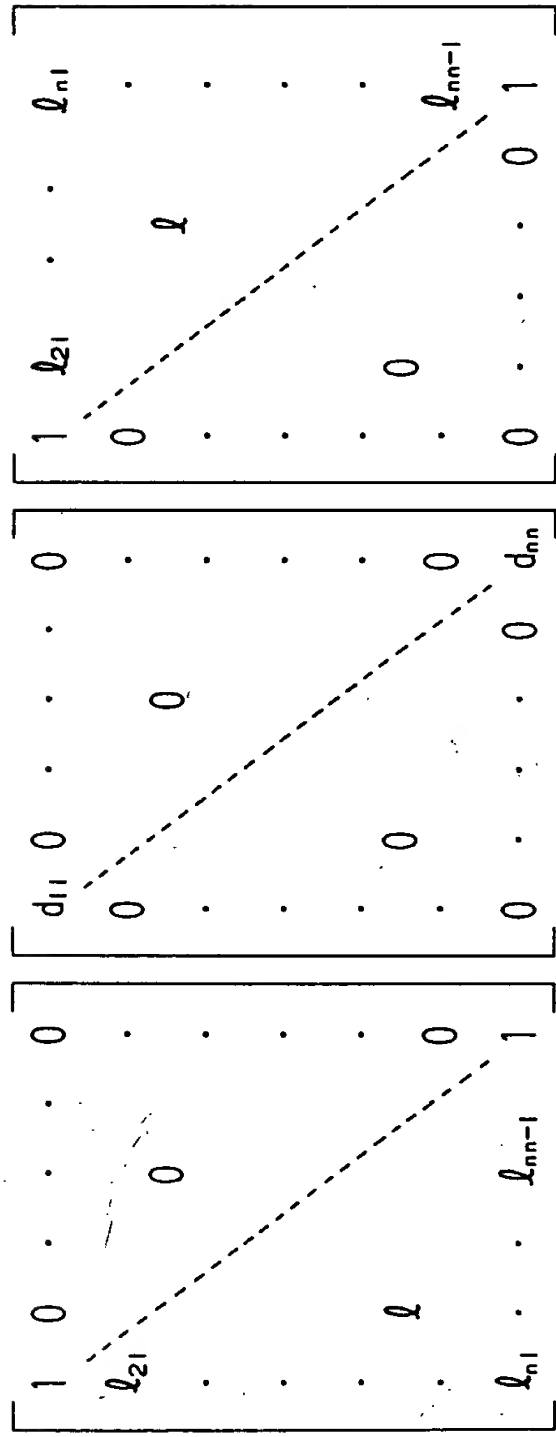
Fig.15C (PRIOR ART)

$$V_p = I_p R = \frac{-R}{Z_{pp}+R} [I_{p1} Z_{pp1}+I_{p2} Z_{pp2}+\sum_{n=1}^M I_n Z_{pn}]$$

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Fig.16 (PRIOR ART)

$$Z = LDU = L D^t L =$$



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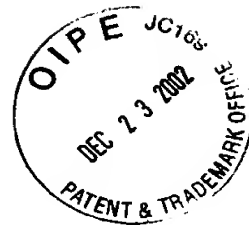
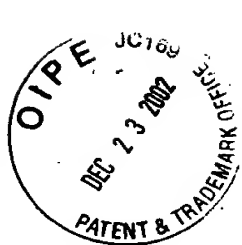


Fig.17 (PRIOR ART)

$$Z = LU = \begin{bmatrix} 1 & 0 & \dots & \dots & \dots & 0 \\ l_{21} & \dots & \dots & \dots & \dots & \dots \\ \vdots & \vdots & \vdots & \vdots & \vdots & \vdots \\ l_{n1} & \dots & \dots & \dots & \dots & \dots \end{bmatrix} \begin{bmatrix} U_{11} & U_{12} & \dots & \dots & U_{1n} \\ 0 & \dots & \dots & \dots & \dots \\ \vdots & \vdots & \vdots & \vdots & \vdots \\ 0 & \dots & \dots & \dots & \dots \\ U_{n-1} & \dots & \dots & \dots & U_{nn} \end{bmatrix} = U$$



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Fig.18 (PRIOR ART)

$$\begin{bmatrix} Z^{0c,c} & Z^{0c,d} & B^{0c,d} \\ Z^{0d,c} & Z^{0d,d} + Z^{dd,d} & B^{0d,d} + B^{dd,d} \\ B^{0d,c} & B^{0d,d} + B^{dd,d} & -Y^{0d,d} - Y^{dd,d} \end{bmatrix} \begin{bmatrix} I_{c,n} \\ I_{d,n} \\ M_n \end{bmatrix} = \begin{bmatrix} V_i \\ 0 \\ 0 \end{bmatrix}$$

Approved
3/7/03
Jen